

## REMARKS

Status of the Claims

Claims 1, 3 – 13, 20 – 24, 26, and 27 are pending. Claims 1, 3 – 13, and 27 are allowed. Claims 2, 14 – 19, and 25 are cancelled. No claims have been withdrawn from consideration.

Declaration Under 37 C.F.R. §1.131

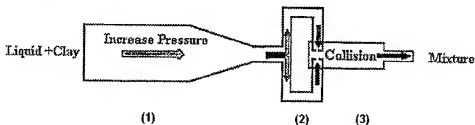
The Declaration Under 37 C.F.R. §1.131 includes an Invention Disclosure Form, attached as Exhibit A as well as statements from the inventors that make clear the invention claimed in the above-identified application was conceived and reduced to practice prior to October 15, 2003. The Declaration also includes a statement that the conception and reduction to practice of the invention claimed in the above-identified application occurred in Canada.

As evidenced by the enclosed Declaration, a person having ordinary skill in the art would understand that the IP Disclosure Form, including Figure 1, establishes conception and reduction to practice of the invention claimed in claim 20, as well as, claims 21 – 24 and 26, which depend from claim 20. Claim 20 is directed to a modified epoxy produced from a pristine epoxy, the modified epoxy having at least higher barrier properties and thermal resistance than the pristine epoxy. The modified epoxy according to claim 20 is produced by a process comprising steps a), b), c), and d). Step b) of claim 20, recites generating a flow of clay solution. Step b) also requires submitting said flow to conditions (1), (2), and (3). Condition (3) of step (b) recites submitting the flow of clay solution to a sudden lower pressure, yielding a dispersed clay solution having a fine and homogeneous distribution of clay particles of a dimension in the nanometer range in the clay solution.

The final Office Action mailed December 27, 2010 errs by asserting condition (3) of step (b) is not disclosed in the IP Disclosure Form. The final Office Action takes a single sentence on page 2 of the IP Disclosure Form out of context and asserts that sentences fails to provide *ipsis verbis* support for the

phrase, “a sudden lower pressure, yielding a dispersed clay solution having a fine and homogeneous distribution of clay particles of a dimension in the nanometer range in the clay solution” as recited in claim 20. More specifically, in evaluating whether this phrase of claim 20 is supported in the IP Disclosure Form, the Office Action only considers the following sentence on page 2 of the IP Disclosure Form: “The sudden collapse from high pressure in the tiny pipes to very low pressure in the chamber explodes the particles into the mist of the liquid solution of the matrix.”

The enclosed declaration includes the testimony of the inventors of the present application that in the context of the IP Disclosure Form as a whole, a person having ordinary skill in the art would understand that the sentence upon which the final Office action focuses, can mean, “The sudden collapse from high pressure in the tiny pipes to very low pressure in the chamber explodes the particles into the mist of the liquid solution **[which can include an epoxy or which can subsequently be mixed with epoxy to form part]** of the **[ultimate epoxy]** matrix.” This interpretation is especially apparent in view of Figure 1 of the IP Disclosure Form (reproduced below with annotations), which illustrates a process, into which liquid and clay are fed.



Furthermore, the enclosed declaration explains, Figure 1 shows that the clay solution exits the region of obstacles into a larger chamber, labeled (3) in the Figure above. According to the declaration, a person having ordinary skill in the art would understand that the clay solution exiting the tiny pipes and entering the larger chamber would result in a sudden reduction in pressure.

The present application further corroborates the interpretation of the IP Disclosure Form, set forth in the enclosed Declaration. Figure 1 of the present application (reproduced below) shows a flowchart of a method for making high

performance epoxies according to an embodiment of a first aspect of the present invention.

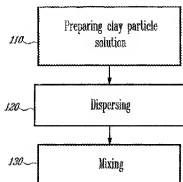


FIG. 1 - 1

Paragraphs [0053] – [0055] of the present application as filed describe Figure 1, stating “The step 110 comprises mixing solvents and clay particles of a dimension in the nanometer range in a liquid solution .... Alternatively, epoxy may also be mixed in solution with the clay particles at this state.”

Again, the modified epoxy according to claim 20 is produced by a process comprising steps a), b), c), and d). The Office Action only disputes condition (3) of step (b). However, for the sake of completeness, the undersigned respectfully submit, the enclosed Declaration further explains, the IP Disclosure Form supports the other steps of claim 20.

Step a) of claim 20 recites mixing solvents and clay particles of a dimension in the nanometer range, to form a clay solution, agglomerates of clay particles forming in the clay solution. Mixing solvents and clay particles to form a clay solution, agglomerates of clay particles forming in the clay solution is disclosed throughout the IP Disclosure Form, for example, in Figure 1, which illustrates liquid and clay fed into a mixing apparatus. Furthermore, page 2 of the IP Disclosure Form describes subjecting a liquid solution to shearing to provide a nano-scale distribution of clay particles. Clay particles of a dimension in the nanometer range are also supported throughout the IP Disclosure Form, including on page 2, which explains an “increase in fracture toughness was obtained by the incorporation of clay particles that have dimensions in the

nanometer range.”

The enclosed Declaration provides evidence that a person having ordinary skill in the art would appreciate that the IP Disclosure Form supports step b) of claim 20, which recites generating a flow of clay solution. Figure 1 of the IP Disclosure Form clearly shows generating a flow of clay solution. Step b) of claim 20 further requires submitting said flow to conditions (1), (2), and (3). As explained in the enclosed Declaration, each of these conditions are supported by the IP Disclosure Form attached as Exhibit A.

- Condition (1) of step (b) recites submitting the flow of clay solution to high pressure. Figure 1 of the IP Disclosure Form shows the clay solution being subjected to increased pressure in a first section, labeled (1) in the Figure above, of a mixing apparatus. Furthermore, page 2 of the IP Disclosure Form describes, “[t]he procedure used here is to run the mixture through tiny pipes under very high pressure (20,000 psi). There is significant shearing in the liquid solution when it is subjected to this flow under high pressure.”
- Condition (2) of step (b) recites submitting the flow of clay solution to high velocity and breaking impacts in a region of obstacles to allow the agglomerates to be broken down. A person having ordinary skill in the art would understand that Figure 1 of the IP Disclosure Form illustrates step (b). The previously-discussed first section of the mixing apparatus illustrated in Figure 1 is followed by a region of obstacles, i.e, a tortuous path having a smaller flow diameter. The region of obstacles is labeled (2) in the Figure above. The velocity of the clay solution increases as it passes through the narrower flow diameter. The region of obstacles, illustrated in Figure 1 of the IP Disclosure Form, includes splitting the flow of the clay solution into at least two separate flows. The separate flows are redirected multiple times and finally, redirected toward one another. A person having ordinary skill in the art would understand that the region of obstacles illustrated in Figure 1 of the IP Disclosure Form would allow the agglomerates of clay particles in the clay solution to be broken down.

- As discussed above, condition (3) of step (b) was fully disclosed in the IP Disclosure Form.

Finally, the enclosed Declaration makes clear that the IP Disclosure Form supports step c) of claim 20, which recites mixing the dispersed clay solution with at least part of the pristine epoxy. This step is supported throughout the IP Disclosure Form, including page 2, which explains, "[t]he new materials provide fracture toughness that is many times more than the fracture toughness of the current epoxy. ... This increase in fracture toughness was obtained by the incorporation of clay particles that have dimension in the nanometer range." Figure 2 of the IP Disclosure Form also shows a comparison of the fracture toughness of the developed resin as compared with other resins.

It is respectfully submitted that the showing of facts presented in the enclosed Declaration under 37 C.F.R. §1.131 is sufficient, in character and weight, to establish conception and reduction to practice prior to the effective date of the reference.

#### Claim Rejections

The Office Action rejects claims 20 – 22, and 24, citing 35 U.S.C §102(e) or 35 U.S.C. §103(a) and US 2005/0119271 by Drzal et al. (hereinafter, "Drzal"). The enclosed Declaration establishes that the presently claimed invention was conceived and reduced to practice prior to October 15, 2003, the 102(e) date according to the Office Action. Drzal is not citable prior art under 35 U.S.C. §102(e) or 35 U.S.C. §103(a). Therefore, the present rejection should be withdrawn.

The Office Action rejects claims 23 and 26, citing 35 U.S.C. §103(a), Drzal, and US 4,465,542 to Furihata (hereinafter, "Furihata"). Drzal is not citable prior art under 35 U.S.C. §102(e) or 35 U.S.C. §103(a). Additionally, Furihata does not teach or even hint at a modified epoxy, as recited in claim 23. Therefore, the present rejection should be withdrawn.

Fee Authorization

The Director is hereby authorized to charge any deficiency in fees filed, asserted to be filed, or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account 14-1437. Please credit any excess fees to such account.

Respectfully submitted,  
**NOVAK DRUCE + QUIGG, LLP**

/Michael P. Byrne/

Date: February 28, 2011

---

**Gregory A. Nelson, Reg. No. 30,577**  
525 Okeechobee Blvd.,  
15<sup>th</sup> Floor  
West Palm Beach, FL 33401  
Phone: (561) 847-7800  
Fax: (561) 847-7801

**Michael P. Byrne, Reg. No. 54,015**  
300 New Jersey Ave, NW  
5<sup>th</sup> Floor  
Washington, D.C. 20001  
Phone: (202) 659-0100  
Fax: (202) 659-0105

Enclosure: Declaration Under 37 C.F.R. §1.131